

## SECTION 074144

### COMPOSITE METAL WALL AND ROOF PANEL SYSTEMS

#### PART 1 - GENERAL

##### 101. EXTENT

- 101.1 The intent of this Section is to define the minimum requirements for composite (factory-foamed) insulated metal wall and roof panel systems in accordance with the design drawings, the technical data and as herein specified.
- 101.2 CONTRACTOR shall be fully responsible for the design of composite metal wall and roofing systems in accordance with the applicable building and energy conservation codes. Work shall include the design, fabrication, furnishing, delivering, unloading and erection of walls and roofs designated as composite metal siding or metal roofing on the design drawings. The basic system components include KYNAR coated ribbed exterior sheets, polyester coated liner sheets, factory-foamed insulation and accessories (including fasteners, batten caps, sealants, flashings and appurtenances) required to form weathertight enclosures.
- 101.3 All penetrating items shall be sealed by the CONTRACTOR to satisfy weather resistant criteria for the enclosure and to accommodate the temperature and movement characteristics of the penetrating items at the wall or roof.
- 101.4 Openings and steel penetrations shall be indicated on the design drawings for wall and roofs. Flashing and closure of these openings is included in the Scope of Work.

##### 102. REFERENCE DOCUMENTS

- 102.1 Related standards, specifications, manuals, codes and/or other publications of nationally recognized organizations are referenced herein. Methods, equipment and materials intended to be used by the CONTRACTOR for the detailing, supply, and fabrication of structural steel shall comply with applicable or specified portions of referenced documents, in addition to Federal, State or local codes having jurisdiction.
- 102.2 References to these documents shall be to the issue date as adopted in IBC 2006. If the document is not referenced in IBC 2006, then the reference is to the latest issue date of the document together with the latest additions, addenda, amendments, supplements, etc. in effect on the date of contract award.
- 102.3 Unless otherwise indicated, references to the sponsoring agencies will be made in accordance with the abbreviations indicated.
- 102.4 AISI – American Iron and Steel Institute:
- a. Manual – Cold-Formed Steel Design Manual.
- 102.5 ASCE – American Society of Civil Engineers:
- a. 7 – Minimum Design Loads for Buildings and Other Structures.
- 102.6 ASTM – ASTM International:

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- a. A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- b. D1929 - Standard Test Method for Determining Ignition Temperature of Plastics
- c. E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
- d. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- e. E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- f. E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- g. E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
- h. E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
- 102.7 FM - FM Global:
  - a. Standard 4880 - Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Materials or Coatings, and Exterior Wall Systems
- 102.8 NFPA – National Fire Protection Association:
  - a. 68 – Guide for Venting of Deflagrations.
- 103. SUBMITTALS
- 103.1 Submit the following drawings and data in accordance with the requirements of Section I – Contract Drawing and Data Requirements, to the DISTRICT for review:
  - a. Bill(s) of material listing.
  - b. Manufacturer's data.
  - c. Installation instructions and details.
  - d. Submit with bid all independent laboratory test reports and performance data as specified herein
  - e. Submit a warranty that the KYNAR coatings have been formulated and applied in accordance with the licensor's instructions, and that, under normal conditions, the following standards will be met for a ten-year period.
    - e1. The coating will not chalk or change color.
    - e2. The coating will not crack, check or lose adhesion.
  - f. Submit color chips of all coating colors for the DISTRICT approval prior to coating metals.
  - g. Submit structural design calculations and test reports certified by a local jurisdiction registered professional engineer to verify load-carrying capacities of panel systems and fasteners to the DISTRICT for record purposes.

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104. CONSTRUCTION QUALITY CONTROL

- 104.1 The CONTRACTOR shall be responsible for inspection work as required or as needed.
- 104.2 Any work found defective or not in compliance with these specifications will be rejected and shall be replaced at no additional cost to the DISTRICT.
- 104.3 The manufacturer and the erector shall each have a minimum of five years of industrial enclosure experience.
- 104.4 CONTRACTOR shall examine the areas and conditions under which the work is to be installed and notify the DISTRICT in writing of conditions detrimental to the proper and timely completion of the Work.

105. DELIVERY, STORAGE AND HANDLING

- 105.1 All delivery, storage and handling requirements shall be followed as specified in this Specification.

**PART 2 - PRODUCTS**

201. ACCEPTABLE MANUFACTURERS AND PRODUCTS

- 201.1 CONTRACTORS shall use acceptable manufacturers and products as indicated in the specification or as approved by the DISTRICT. Acceptable manufacturers of the materials and products include only companies with good track records in the industry.
- 201.2 The following are acceptable manufacturers:
  - a. Centria, Moon Township, PA 15108.
  - b. Others approved by the DISTRICT.

202. MATERIAL

- 202.1 Sheet Steel:
  - a. Sheet steel for exterior and interior panel faces shall be ASTM A 653, Grade 37, G90 galvanized steel, non-directionally embossed and planked in a minimum 22 gage.
  - b. The steel shall be properly treated to assure proper adhesion and coating performance. The configuration, gage and coating shall be as specified for the system components and the system design.
- 202.2 Foam Insulation:
  - a. Urethane modified isocyanurate foam having a 2.7 pcf density, a 20 psi shear stress, a 20 psi compressive strength and a 20 psi tensile strength.
  - b. Ignition temperature testing of the foam plastic insulation shall have been established per ASTM D1929.
- 202.3 KYNAR Coating:
  - a. KYNAR coating shall be a factory-applied, oven baked finish based on Elf Atochem North America, Inc.'s KYNAR 500 resin (polyvinylidene fluoride). This finish shall be a dispersion coating based on 70 percent KYNAR 500 as formulated by a KYNAR 500 licensee. Exterior surfaces shall have a two-

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- coat system consisting of 0.2 mils of a corrosion inhibitive primer and 0.8 mils of fluorocarbon topcoat.
- b. The coating shall meet or exceed the physical test performance criteria published by Elf Atochem North America Inc. The finish coating color shall be as specified on the design drawing.
- 202.4 Polyester Coating: Polyester coatings shall be the manufacturer's standard for interior finishes and interior surfaces that are exposed to view shall have the manufacturer's standard white color.
- 202.5 Fasteners: Fasteners shall be Type 305 stainless steel with cadmium plated finish and having combination stainless steel and neoprene washers. Exterior exposed heads and washers shall have color coating to match the exterior sheets.
- 202.6 Sealants and Sealing Tape: Sealants and sealing tape shall be the manufacturer's standard materials that satisfy the system performance requirements.
203. SYSTEM COMPONENTS
- 203.1 Wall/Roof Panel:
- a. Panel units shall be Centria Versapanel units consisting of roll formed steel face and liner elements chemically bonded to a continuously foamed-in-place fire resistant urethane modified isocyanurate core. The configuration and thickness shall be as indicated on the design drawings or as required to satisfy performance requirements.
  - b. Panel assemblies shall have a tested U value not greater than 0.046 Btu/hr·sf·°F and shall comply with the local energy code.
  - c. Exterior surfaces shall have a Kynar coating and interior surfaces shall have a polyester coating, unless specifically noted on the design drawings.
  - d. Panel edges shall be double tongue and groove design with factory applied vapor seal. Structural fasteners and clips shall be concealed within the side joint, mechanically engage both face and liner elements and be designed to prevent crushing of the foam core during fastening.
  - e. For roofs, the rib at the panel side joint shall be covered with a mebbed mastic sealant and a roll formed metal cap having the same gage and finish as the panel exterior.
- 203.2 Parapet Components:
- a. Parapet caps shall be formed from 18-gage (minimum) KYNAR coated sheet steel.
  - b. Parapet back-up sheets shall be flat 18-gage (minimum) or corrugated 22-gage (minimum) panel KYNAR coated sheet steel.
  - c. Parapet insulation pans and parapet cap supports shall be formed from 20-gage (minimum) sheet steel.
- 203.3 Flashing: Unless otherwise specified or specific applications, flashing shall be formed from 22-gage (minimum) coated sheet steel. The flashing coating shall be the same as the coating of adjacent metal components specified herein.
- 203.4 Roof Membrane Counterflashing: Counterflashing for roof membranes shall be two-piece flashing formed from 0.049 stainless steel sheet metal.

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- 203.5 Ribbed Sheet Closures: Metal and premolded neoprene closures shall be the manufacturer's standard products.
204. SPECIAL ASSEMBLIES
- 204.1 Blow-Off Panel Assembly:
- a. Blow-off panel area assemblies shall be provided with a fastening system designed to release the panels in the event of interior pressure buildup as indicated on the design drawings.
205. PERFORMANCE TEST REQUIREMENTS FOR WALL AND ROOF ASSEMBLIES
- 205.1 An independent laboratory shall have tested wall and roof assemblies for the following:
- a. Thermal Transmission - Insulated panel assemblies shall satisfy the total thermal conductivity value (U-factor) specified herein.
  - b. Wall Air Infiltration - Air infiltration shall not exceed 0.03 cfm per square foot at a static pressure of 1.56 psf when tested per ASTM E283.
  - c. Roof Air Infiltration - Air infiltration shall not exceed 0.03 cfm per square foot at a static pressure of 1.56 psf when tested per ASTM E1680.
  - d. Wall Water Penetration - There shall be no uncontrolled water penetration at a static pressure of 10 psf when tested per ASTM E331.
  - e. Roof Water Penetration - There shall be no uncontrolled water penetration at a static pressure of 6.24 psf when tested per ASTM E1646.
  - f. For roofing, manufacturer shall demonstrate compliance with UL Class 90 or FM I90 as required.
  - g. Foam core and interior surface of the complete panel system shall comply with surface burning characteristics (ASTM E84) for flame spread 25 or less and for smoke developed 450 or less.
  - h. Wall panel units shall be approved as Class 1 insulated walls per FM Standard 4880.
  - i. Wall and roof panels shall be classified as a component of fire resistant construction per UL Standard 263.
  - j. Explosion Relief - Blow-off assembly release devices shall be performance tested.
206. WALL AND ROOF SYSTEM STRUCTURAL DESIGN
- 206.1 Design loads shall satisfy the requirements of ASCE-7 with the wind loads based on basic wind speeds at 50-year mean recurrence interval.
- 206.2 Walls and roofs assemblies shall be designed without exceeding a deflection of L/180 in accordance with AISI Cold-Formed Steel Design Manual.
- 206.3 Girts have been designed with a deflection limit of L/180 and are spaced not greater than 10-feet-0 inches apart. Purlins have been designed with a deflection limit of L/180 and are spaced not greater than 5 feet-6 inches apart.

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- 206.4 Variations in wind loads on large enclosures may be accommodated by changes in sheet gages, not by changes in sheet configuration.
- 206.5 Blow-off assembly areas, where indicated on the design drawings, shall be designed by the CONTRACTOR to release at the pressures specified on the design drawings. The panels shall be provided with restraints to tether the panels so they do not become missile hazards in accordance with NFPA 68.
- 206.6 Panel cantilevers shall not exceed 1'-0".
- 206.7 Roof slopes shall not be less than 1:12.

### **PART 3 - EXECUTION**

#### **301. COORDINATION**

- 301.1 Prior to erection, the CONTRACTOR shall check the accuracy of the alignment of girts and purlins to see that they are within the allowable tolerances for the installation of walls, roofs and partitions. The CONTRACTOR shall notify the DISTRICT of deficiencies, so they can be rectified prior to erection. Do not proceed until unsatisfactory conditions are corrected.
- 301.2 The schedule for building enclosure completion shall be coordinated with the DISTRICT.
- 301.3 The installation of wall, roof or partition areas designated as construction openings shall be deferred until the DISTRICT provides the direction to complete that work.

#### **302. ERECTION**

- 302.1 Erect walls, roofs, partitions and related items in accordance with the CONTRACTOR's shop drawings and performance requirements.
- 302.2 Protect all insulation material from the weather during erection to avoid water damage.
- 302.3 Protect completed work from abuse by other trades. The CONTRACTOR shall be responsible for protecting walls, roofs and partitions from wet cement, painting operations, etc.
- 302.4 Flashing shall be installed straight and neat. Alignment and spacing of fasteners shall be maintained, and excessive exposed sealant material shall be removed.

#### **303. DAMAGE MATERIAL AND CLEANING**

- 303.1 Replace damaged panels and other components that cannot be repaired by finish touch-up or similar minor repair.
- 303.2 Remove filings caused by drilling or cutting from finished surfaces immediately to prevent rust staining.
- 303.3 Wipe down each area after erection is complete for final acceptance.

#### **304. INSPECTION AND TESTING**

- 304.1 Inspection by the DISTRICT: The DISTRICT may during the course of the work, inspect the various phases of work performed by CONTRACTOR for compliance with the requirements of this section

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- and the design drawings. The DISTRICT reserves the right to approve facilities used by the CONTRACTOR for inspections and examinations.
- 304.2 Inspection by the CONTRACTOR: Review material for compliance with this specification. CONTRACTOR shall be responsible for, and shall pay his own costs, for the specified inspection.
- 304.3 Extent and Method of Inspection: Conform to the Acceptance Standards of the specified material.
- 304.4 Acceptance: Material shall meet the acceptable standards of the specified standards. Acceptance of the work by the DISTRICT shall not relieve CONTRACTOR from full responsibility for the Work.
- 304.5 CONTRACTOR shall provide a final inspection of the completed installed roofing system by a technical representative of the roof system manufacturer.

END OF SECTION 074144

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